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GEOTECHNICAL INVESTIGATION

AND

ENGINEERING REPORT

FOR

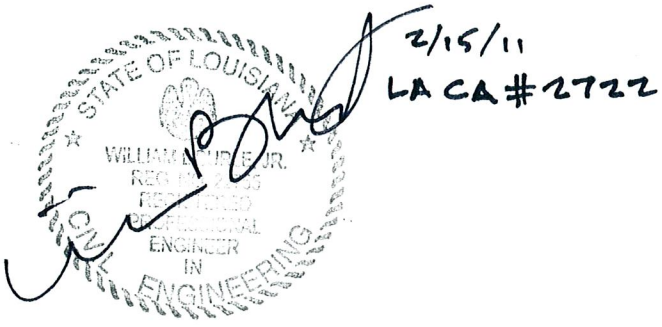
GRAVESITE EXPANSION PROJECT
VA PROJECT NO. 870 CM 3022

AT

PORT HUDSON NATIONAL CEMETERY
ZACHARY, LA

Submitted To:

Carter-Burgess, Inc.
A Wholly Owned Subsidiary of Jacobs
180 Promenade Circle, Suite 300
Sacramento, CA 95834



February 15, 2011

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Project No. 03280-4-0110
PHNC

W.L.BURLE
ENGINEERS, P.A.

February 15, 2011

Mr. William M. Romzick, ASLA
Carter-Burgess, Inc., A Division of Jacobs
180 Promenade Circle, Suite 300
Sacramento, CA 95834

Re: Geotechnical Investigation and Engineering Report
Gravesite Expansion Project
VA Project Number 870 CM 3022
Port Hudson National Cemetery
Zachary, LA

Dear Mr. Romzick:

W. L. Burle, Engineers, P.A. has completed the authorized geotechnical investigation and engineering report for the referenced project. This report contains the results of our findings, an engineering interpretation of these with respect to the available project characteristics and recommendations to aid in the design and construction of the site work and foundation systems for the proposed project.

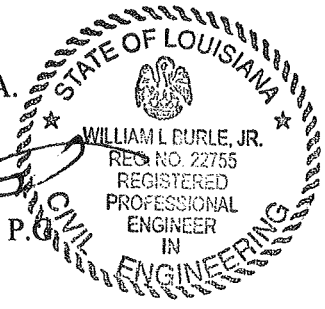
In summary, the results of our investigation indicate that:

- The recommended site work activities consist of clearing/grubbing operations and constructing an engineered fill to bring the site to grade;
- The pavement design recommendations consist of both flexible (asphalt) and rigid (concrete) systems;
- The building can be supported by shallow foundation systems; and
- Dewatering activities will probably not be needed for excavation/construction work that is conducted at depths of 8' below ground surface or less.

We appreciate having the opportunity to work with you during the site investigation phase of this project and look forward to assisting you during construction phase. If we can be of further assistance or should you have any questions regarding this report, please contact our office.

Sincerely,

W. L. BURLE, ENGINEERS, P.A.



William L. Burle, Jr., Ph.D., P.E., P.G.

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TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION AND PURPOSE

Carter-Burgess/A Division of Jacobs (CLIENT) of Sacramento, CA, retained W. L. Burle, Engineers, P.A. (BURLE) to conduct a geotechnical investigation for the gravesite expansion project located at the Port Hudson National Cemetery in Zachary, LA.

The purpose of the geotechnical investigation is to:

- determine the general, on-site, sub-surface soil and groundwater conditions,
- evaluate the findings with respect to the proposed construction,
- identify potential problems which may develop during construction, and
- recommend appropriate foundation and pavement systems for the proposed project.

The work was performed in accordance with the CLIENT's scope of work (see Appendix E) with the exception of the following:

- Shallow Borings – The ten (10) shallow borings (8' deep) and the associated soil testing were not preformed under this scope of work. The work will be performed at a later date as soon as the location for the septic tank drain field location is determined.

These exceptions were discussed with CLIENT. CLIENT agreed to these exceptions prior to the start of the field work.

2.0 PROJECT CHARACTERISTICS

The site is in Sections 66 and 88, Township 5 South, Range 1 West, East Baton Rouge Parish, LA. The site is located in the southwest corner of the Salvant Road/Mt. Pleasant-Port Hickey Road intersection. The site is referenced on Figure 1.

The site is a 103.814 acre tract of timberland. Improvements on-site consist of a wood building in the northeast corner of the site, abandoned pipelines and abandoned oil/gas well sites. The on-site elevations range from approximately 70 to 90 feet MSL with relief to the southwest.

The proposed project is a gravesite expansion project. The proposed project's Master Plan has not yet been designed. The project's proposed improvements will involve the construction of an entrance area, a public information center, an administration/ maintenance complex, a flag/assembly area, a memorial walkway, one committal service shelter, roadways/parking areas, site furnishings, interment areas for traditional and lawn crypt burials, in-ground cremains sites, columbarium niches, a garden for scattering remains, underground utilities, an Avenue of Flags and a Carillon Tower. An on-site septic system is proposed as well. The lay-out of these improvements is not known at this time.

The building loads were estimated by BURLE based on the proposed construction. The loading is referenced below:

Column Loads = 40 kips (k) or less
Wall Loads = 2 k/linear foot or less
Floor Slab Loads = 40 to 125 pounds per square foot (psf)

If the project's Master Plan differs from this report's description, BURLE will evaluate the differences and amend this report, if warranted.

3.0 GEOLOGICAL SETTING

A study of the geologic survey of Louisiana indicates that this site is in the Atlantic/Gulf Coastal Plain Province. The site is specifically in the East Gulf Coastal Section of the province. The surficial deposit within the section is the Prairie Terrace. The deposit is of Pleistocene age. The deposit consists of a light gray to light brown clay, sandy clay, silt, sand and occasionally gravel material. The formation varies in depth throughout the East Baton Rouge Parish area.

4.0 FIELD AND LABORATORY METHODS

Fifteen (15) soil test borings, designated B-1 through B-15, were drilled on the project site at the locations shown on Figure 2. The borings were drilled to depths of 20 feet to 40 feet below ground surface (bgs). Actual boring locations and depths used to investigate the project were selected by BURLE. Also, the boring locations (horizontal and vertical) were referenced in the field by BURLE.

All borings were made with a truck-mounted drill rig using the hollow-stem auger (HSA) drilling method. The Standard Penetration Test (STP) method (ASTM D-1586) was used to obtain disturbed soil samples at maximum intervals of five feet or at major changes in soil conditions. The recovered samples were visually classified (ASTM D-2487) in the field, logged and sealed in moisture proof containers.

Borings B-1, B-3, B-6, B-7, B-8, B-9, B-11, B-12, B-13 and B-15 were converted to 2" PVC monitoring wells, MW-1 through MW-10, respectively. The wells were constructed by BURLE (Louisiana Water Well Contractor License number WCC-388). The work was performed in accordance with the Louisiana Office of Conservation/Environmental Division/Ground Water Resources (GWR) protocol. The wells were registered with the GWR. The well completion records are documented in Appendix B.

Groundwater levels were monitored during and after the drilling operation. All readings were recorded on the field boring logs. Upon completion of all field activities, the open boreholes were properly abandoned in accordance with GWR protocol.

Preliminary test boring logs were developed on the job site by the drill foreman. At the completion of the field program, the samples were taken to the laboratory where they were again examined and classified, in accordance with the Unified Soil Classification System

(USCS), by a soils technician and/or the project engineer; the field classifications were revised where necessary. The soil descriptions, USCS symbols and SPT values (N) are referenced on the Test Boring Logs.

In addition to the field investigation, supplementary laboratory analyses were performed to aid in the soil classification and to further define the pertinent physical/chemical properties of the foundation soils. Atterberg Limits and moisture content tests were performed on selected samples. Sieve analyses were performed on select samples to aid in determining soil classification. Selected soil samples were obtained and tested for pH, ammonia, Total Kjeldahl Nitrogen (TKN), organic content, specific conductivity and moisture in accordance with applicable methods by Test America Laboratory, Inc. of Mobile, AL (see Section 5.2). All laboratory testing was conducted in accordance with appropriate ASTM and/or EPA standards. Results of the laboratory tests are referenced on the Test Boring Logs and/or in the appendices of this report.

5.0 SUBSURFACE INVESTIGATION

5.1 Geology

One (1) stratum of soil exists to the termination depths referenced on the boring logs.

The surficial stratum is a fine-grained deposit consisting of a **lean clay, silt-clay mixture and/or silt** (ML, CL and/or CL-ML). The following comments describe the deposit:

1. The project site is covered by a surficial layer of organic topsoil. The surficial deposit is encountered beneath this layer in all of the borings. The deposit extends to the boring termination depths of 40' bgs.

2. The SPT N values range from 3 to 39 (average = 14.0); these values indicate that the soil's consistency varies from soft to hard (average = stiff).

3. The soil's Liquid Limit (LL) ranges from 19 to 46 and its Plasticity Index (PI) ranges from 1 to 30. Such soils typically exhibit a low to moderate shrink/swell potential actuated by soil moisture loss/gain.

4. The soil's moisture content ranges from 8 to 31%; the deposit is in either its solid to plastic state.

5. A sand lense (SM, SP and/or SM-SP) is encountered beneath or within the deposit. The following describes the lense:

    - The lense is encountered within borings B-2, B-3, B-5, B-6, B-11, B-12, B-13, B-14 and B-15.

- The lense is typically encountered within a vertical zone from approximately 5' to approximately 20' bgs; however, a different deeper sand lense is encountered from approximately 35' to approximately 40' bgs in borings B-11 and B-14.

- The soil's moisture content ranges from 4% to 21% and varies depending on the silt content of the sand.

- The soil's SPT N values range from 18 to 34, indicating the soil's relative density ranges from medium dense to dense.

6. A heavy clay lense (CH) is also encountered within the deposit. The following describes the lense:

   - The lense is encountered within borings B-1, B-2, B-5, B-8, B-9, B-10, B-11, B-12 and B-14.

   - The lense is typically encountered within a vertical zone from approximately 20' to below 40' bgs; however, in boring B-11, a shallower heavy clay lense is also encountered from approximately 10' to approximately 15' bgs.

   - The lense's LL ranges from 50 to 98, and its PI ranges from 28 to 59. Such soils typically exhibit a high shrink/swell potential actuated by soil moisture loss/gain. Since the lense is located below what is believed to be the Active Zone (0 to 10 feet bgs), there is a low risk that the soils will experience seasonal variations in moisture content which can translate to volumetric change (i.e. shrinking and swelling) of the soils.

   - The soil's moisture content ranges from 11% to 45%; the soil is within either its solid or plastic state.

   - The soil's SPT N values range from 9 to 31, indicating the soil's consistency ranges from stiff to hard.

7. The capillary fringe was encountered within the deposit from 15' to 20' bgs for the shallower borings (20') and from 35' to 40' bgs for the deeper borings (40'). The groundwater conditions are discussed in Section 6.0 of this report.

5.2 Geochemical Findings

Selected soil samples were analytically tested to evaluate their corrosivity and reactivity potential, relating to the proposed surface/sub-surface improvements. Two samples were obtained per boring, one at 1' bgs and one at 20' bgs. They were tested for ammonia, TKN, pH, specific conductivity and organic content. Test America Laboratory, Inc. of Mobile, AL, performed the testing.

A tabulation of the soil results is referenced below:

TABLE 6.1 – SOIL ANALYTICAL DATA

BORING	DEPTH (ft)	pH (SU)	AMMONIA (mg/kg)	TKN (mg/kg)	SPECIFIC CONDUCTANCE (umhos/cm)	ORGANIC CONTENT (%)
B-1	1	6.20	<0.59	290	340	1.9
B-1	20	7.40	1.2	220	93	3.6
B-2	1	5.29	<0.60	510	52	2.4
B-2	20	8.14	2.1	280	120	3.6
B-3	1	5.11	<0.61	440	42	3.9
B-3	20	6.05	0.76	110	38	1.6
B-4	1	6.83	<0.61	320	71	3.2
B-4	20	7.43	4.70	140	300	3.4
B-5	1	4.98	<0.62	610	58	2.7
B-5	20	7.45	7.70	100	47	3.8
B-6	1	5.40	<0.61	330	99	3.3
B-6	20	7.35	2.3	170	83	3.3
B-7	1	5.23	<0.49	390	34	2.5
B-7	20	5.64	3.1	160	51	2.3
B-8	1	6.12	3.2	590	190	3.8
B-8	20	6.18	4.1	130	44	1.7
B-9	1	4.85	<0.63	380	50	3.1
B-9	20	6.33	7.0	56	39	2.2
B-10	1	5.24	0.6	250	28	2.1
B-10	20	5.76	3.7	93	39	3.5
B-11	1	4.68	0.78	300	43	2.8
B-11	20	5.78	2.6	87	59	4.5
B-12	1	5.50	<0.62	350	52	3.2
B-12	20	6.09	5.1	110	43	2.4
B-13	1	4.98	<0.59	920	47	2.8
B-13	20	5.48	0.98	160	36	2.2
B-14	1	4.92	2.0	1900	140	5.0
B-14	20	6.15	0.64	56	27	2.1
B-15	1	5.21	<0.62	890	61	3.2
B-15	20	7.42	15.0	120	310	2.1

The following is a discussion of the data based on the surficial data (1' bgs) and the sub-surface data (20' bgs):

- Surficial Soils Data (1' bgs)
  - pH – The soil's pH values range from 4.68 to 6.83 (average = 5.37). The surficial soils are slightly acidic.
  - Ammonia – The soil's ammonia concentrations range from <0.49 to 3.2 mg/kg (average = 0.613 mg/kg).
  - TKN – The soil's TKN concentrations range from 250 to 1,900 mg/kg (average = 565 mg/kg).

- Specific Conductance – The soil's specific conductance ranges from 28 to 340 umhos/cm (average = 87.1 umhos/cm).

- Organic Content – The soil's organic content ranges from 1.9 to 3.9% (average = 3.06%).

- Sub-Surface Soils Data (20' bgs)

  - pH – The soil's pH values range from 5.48 to 8.14 (average = 6.58).

  - Ammonia – The soil's ammonia concentrations range from 0.64 to 15.0 mg/kg (average 4.06 mg/kg).

  - TKN – The soil's TKN concentrations range from 56 to 280 mg/kg (average = 133 mg/kg).

  - Specific Conductance – The soil's specific conductance ranges from 27 to 310 umhos/cm (average 88.6 umhos/cm).

  - Organic Content – The soil's organic content ranges from 1.6 to 3.8% (average = 2.82%).

Since most of the sub-surface structures will be constructed/placed within the site's surficial zone (0 to 20' bgs), the surficial zone's data was reviewed for relevance to such structures. Based on a review of the surficial soil zone's findings, there does not appear to be an increased risk of corrosion and reactivity for any of the proposed improvements planned for the project.

6.0 GROUNDWATER EVALUATION

6.1 Monitoring Well Installation, Sampling and Testing

The well construction work was performed on December 20 and 29, 2010, and January 4, 5, and 6, 2011. The 2" wells, MW-1 through MW-10, were installed using 4-1/4" I.D. HSA. The installation procedure for each well began by placing a disposable plug in the auger bit. The auger/plug assembly was advanced to the desired well depth and then retracted approximately 6" to 12". The well was inserted into the HSA and used to dislodge the disposable plug from the bit. As the auger was withdrawn, sand was poured down the opening between the well and the HSA from the bottom of the well screen to a minimum of one foot above the screen. A three foot bentonite seal was placed above the sand; potable water was poured over the seal to induce swelling. After the seal had completely swelled, the annular zone was filled with a non-shrinking grout. A flush-to-ground surface casing was then placed around the well. Well completion records for all of the wells are referenced in the appendices.

On January 6, 2011, the wells were developed by overpumping. Three (3) well volumes were removed from each well, with the exception of MW-7 which was dry.

On January 20, 2011, the sampling program began and is described below:

- Monitoring – All wells, with the exception of MW-7, were monitored. The water table intersected the wells' screened intervals, with the exception of MW-7 which was dry.

- Purging/Sampling Monitoring Wells – The wells which contained groundwater were purged and sampled. During the purging operation, three well volumes were removed from the wells. The wells recharged to approximately 75% of their original height prior to sampling. Water samples were obtained and placed in appropriate glassware.

- Sample Preservation/Testing – All samples were preserved on-ice and submitted to Micro Methods Laboratory, Inc. of Ocean Springs, MS, for sulfate testing.

  Due to the holding times for pH and carbon dioxide (15 minutes), BURLE performed these tests in the field and documented the results.

A breakdown of the field data is referenced below:

TABLE 6.2 –GROUNDWATER TABLE DATA

SAMPLING DATE	BOREHOLE/MW	TOP OF CASING ELEVATION (FT)	SCREENED INTERVAL (FT)	DEPTH TO WATER (FT)	WATER TABLE ELEVATION (FT)
1/20/11	SB-1/MW-1	85.93	60.93-45.93	8.00	77.93
1/20/11	SB-3/MW-2	87.83	82.83-67.83	15.48	72.35
1/20/11	SB-6/MW-3	90.14	85.14-70.14	16.62	73.52
1/20/11	SB-7/MW-4	87.51	62.51-47.51	21.95	65.56
1/20/11	SB-8/MW-5	87.92	62.92-47.92	29.90	58.02
1/20/11	SB-9/MW-6	87.58	62.58-47.58	23.50	64.08
1/20/11	SB-11/MW-7	85.36	60.36-45.36	Dry	--
1/20/11	SB-12/MW-8	87.59	62.59-47.59	20.05	67.54
1/20/11	SB-13/MW-9	85.59	80.59-65.59	15.89	69.70
1/20/11	SB-15/MW-10	87.52	82.52-67.52	15.28	72.24

6.2 Groundwater Flow

Two different aquifers were encountered during the study. The 20' wells, which were screened from 5' to 15' bgs, encountered a perched water source, and the 40' wells, which were screened from 25' to 40' bgs, encountered what is believed to be the surficial aquifer. Both are referenced on Figure 3. The following information describes both aquifers:

- Perched Water Source – The groundwater was encountered at depths ranging from 15.28 to 16.62 feet bgs. The groundwater flow appears to be in a southerly direction at a hydraulic gradient ranging from 0.0014 to 0.0018 ft/ft.

- Surficial Aquifer – The groundwater was encountered at depths ranging from 8.00 to 29.90 feet bgs. The groundwater flow appears to be in a southwesterly direction at a hydraulic gradient ranging from 0.008 to 0.01 ft/ft.

6.3 Groundwater Water Quality

The following is a tabulation of the groundwater water quality data for the groundwater samples obtained from the sampled monitoring wells:

TABLE 6.3 – GROUNDWATER (GW) CONCENTRATIONS

Monitoring Well	Depth (ft)	pH (SU)	GW Concentration (mg/l)	
			Sulfate as SO_4	Carbon Dioxide
MW-1	40	7.0	45.0	77.50
MW-2	20	6.5	28.0	58.00
MW-3	20	7.8	15.0	62.50
MW-4	40	7.2	9.51	65.00
MW-5	40	7.5	32.0	47.50
MW-6	40	7.6	34.0	50.00
MW-7	40	--*	--	--
MW-8	40	7.5	22.0	58.00
MW-9	20	8.0	24.0	68.75
MW-10	20	7.8	62.0	87.50

* Dry well

The following conclusions are drawn based on these findings:

- Perched Water Water Quality

  - pH Values – The pH values range from 6.5 to 8.0 (average = 7.53). These are neutral to slightly basic. This indicates that the groundwater should not present a corrosion problem to any sub-surface structures.

- Sulfate Values – The sulfate values range from 15.0 to 62.0 mg/l (average = 32.25 mg/l). These values are all below the EPA sulfate secondary water quality standard of 250 mg/l. These findings indicated that the groundwater should not pose a corrosion problem to any sub-surface structures.

- Carbon Dioxide Values – The carbon dioxide values range from 58.00 to 87.50 mg/l (average = 69.19 mg/l). Groundwater typically has a CO_2 concentration of approximately 50 mg/l. Even though the CO_2 values are slightly higher than the typical groundwater value, the risk for this source to produce elevated carbonic acid is considered minimal and, therefore, the risk to cause corrosion to under-ground structure is also considered minimal.

• Surficial Aquifer Water Quality

- pH Values – The pH values range from 7.0 to 7.6 (average = 7.36). These are neutral to slightly basic. This indicates that the groundwater should not present a corrosion problem to any sub-surface structures.

- Sulfate Values – The sulfate values range from 9.51 to 45.0 mg/l (average = 28.50 mg/l). These values are all below the EPA sulfate secondary water quality standard of 250 mg/l. These findings indicated that the groundwater should not pose a corrosion problem to any sub-surface structures.

- Carbon Dioxide Values – The carbon dioxide values range from 47.50 to 77.50 mg/l (average = 74.50 mg/l). Groundwater typically has a CO_2 concentration of approximately 50 mg/l. Even though the CO_2 values are slightly higher than the typical groundwater value, the risk for this source to produce elevated carbonic acid is considered minimal and, therefore, the risk to cause corrosion to under-ground structure is also considered minimal.

7.0 DESIGN RECOMMENDATIONS

The following recommendations are made based on the subsurface findings and the project characteristics:

7.1 Site Work

1. Demolition Operations:

The project site will require some demolition activities. All conflicting pavement, foundations/buildings and/or utility systems should either be removed prior to construction or adjusted to accommodate the proposed construction.

2. Clearing/Grubbing Activities:

The project site should be cleared and grubbed. The operation will remove the vegetation, trees and organic-laden top soils located within the proposed construction areas. The depth of excavation will vary. The horizontal limits of excavation should extend 5 feet outside the exterior lines of the proposed foundation, pavement and crypt areas. Pavement areas to remain should be protected during the construction phase. A geotechnical engineer should inspect the site to determine if the buildings, parking areas, crypt and columbarium areas have been properly cleared/grubbed.

The excavated material is unsuitable for use and should be disposed of off-site.

3. Excavation Activities – Sub-Surface Structures:

The project site will require excavation activities to prepare the site for the construction of the sub-surface structures. The soils will be excavated to a depth of approximately 6 to 8 feet. For the crypt structures, this will provide sufficient depth to accommodate the overall design (gravel bed, double-depth crypt system and soil cover).

At this depth, groundwater should not be encountered. However, if it is encountered, at depths of 8' bgs or less, it is probably not associated with either of the two aquifers previously discussed and is probably associated with trapped, sub-surface stormwater. Dewatering operations sufficient to address such isolated conditions are discussed in detail in Section 7.8.2 of this report.

4. Engineered Fill Construction:

Upon completion of the clearing/grubbing and/or excavation operations, the cleared, sub-grade should be graded and compacted to 95% Standard Proctor Density (ASTM D-698). If unstable soil conditions (i.e. pumping) and/or groundwater are encountered, the situation should be reviewed by a geotechnical engineer as noted in Section 7.8.1 of this report.

After the sub-grade has been properly prepared, an engineered fill consisting of select fill material should then be immediately constructed within the excavated area. The fill will serve to build the site to grade. The select fill material should consist of imported, non-organic and debris-free silty clays (CL), sandy clays (CL) or clayey sands (SC) having a PI within the range of 5 to 25 and a LL less than 35.

The fill should be placed in 8" loose lifts and compacted to 95% Standard Proctor density at moisture contents within 3% of optimum moisture. The

lifts/benches should be level. The fill should be constructed in this manner until the site is brought to grade.

Testing services, consisting of the testing of the compacted fill, should be performed. The density and moisture content of the in-place fill material should be verified by testing at a frequency of one test per 2500 square feet per six (6) inch compacted lift. Nuclear gauge (ASTM D-2922) or sand cone methods (ASTM D-1556) are approved testing methods for density verification.

7.2 Earth Retaining Structures

The excavation activities planned for the project site will require the construction of earth retaining structures. The following earth pressure coefficients are provided to assist in the design of any earth retaining systems:

- Coefficient of Active Earth Pressure, $K_a = 0.75$
- Coefficient of Passive Earth Pressure, $K_p = 1.50$
- Coefficient of Earth Pressure at Rest,, $K_o = 0.60$

These values are based on an evaluation of the surficial, clay/silt deposit to a depth of 8' bgs. The angle of internal friction is estimated to be approximately 5°.

7.3 Foundation System

The proposed administration building can be supported by a shallow foundation system consisting of either continuous and/or spread footings. The allowable gross soil bearing capacity is 2,300 psf. (Safety Factor = 3.0). Total settlement under this loading is anticipated to be less than 1.0 inch (differential settlement is anticipated to be less than 0.5 inches).

The following information is provided to assist in designing the foundation systems:

- Foundation Design – The foundation system should be designed by a structural engineer. Minimum footing widths are recommended even if the design will allow for smaller footings; continuous footings should not be less than 16 inches wide and spread footings should not be less than 30 inches wide. The base of the footings should extend below the frost line (approximately 12 inches bgs in Zachary, LA) and into the engineered fill.
- Seismic Information – The site class identification for the building site is Site Class D (IBC 2000 Section 1615.1).

7.4 Floor Slab

The flooring system for the administration building should be a reinforced-concrete, slab-on-grade system. The system should be sized by a structural engineer. The floors should be supported by a prepared sub-grade. Two (2) equivalent options are offered for preparing the sub-grade.

Option 1 – Granular Mat –

A mat of granular material (4 inch thick) may be placed upon the prepared engineered fill. This material should be naturally-occurring earth material fairly well-graded with an upper particle size diameter of 1 inch. A minimum of 30% should pass the No. 10 sieve and a maximum of 5% should pass the No. 200 sieve. This material should be spread uniformly over the sub-grade and tamped or rolled to provide a firm, true surface for placing concrete. A moisture barrier should be placed over the granular material.

Option 2 – Engineered Fill –

The engineered fill described in Section 7.1.4 of the report can serve as the sub-grade for the floor slab system. A moisture barrier should be placed over the fill prior to the construction of the floor slab/foundation system.

7.5 Pavement System

The pavement recommendations have been prepared using the AASHTO structural number analysis for asphalt systems and the PCA system for concrete pavements. The following are the recommended pavement options for the project.

AUTOMOBILE DRIVES/PARKING LOT

Option 1 – Rigid (Concrete) Pavement Design –

The pavement system may consist of a 6 inch thick unreinforced concrete pavement system supported by a 6" thick compacted base course (see base course description under Option 2 below). The concrete mix should be a 28-day compressive strength of 3500 psi. If needed, an engineered fill, consisting of compacted select fill material, can be used as sub-base material to bring the sub-base to grade; applicable fill construction specifications are referenced in Section 7.1.4 of this report.

Option 2 – Flexible (Asphalt) Pavement Design –

The required, weighted SN for the roadway is 3.35. The number is based on a Group Index of 12.0, a sub-base CBR value of 5, and equivalent daily traffic value of 300 and a regional weighting factor of 3.0.

The following is the recommended asphalt pavement design for the project:

- Asphalt Pavement/Base Course – The pavement system should consist of:
  - 5.0 inches of hot bituminous asphalt pavement; and
  - 10.0 inches of compacted, crushed stone – Louisiana Department of Transportation and Development (LaDOTD) specification Class II Base Course.

  These are discussed as follows:
  - Asphalt Pavement – The asphalt pavement should consist of a single-lift, 1.5 inches thick wearing course (12.5 mm asphalt mix) supported by two-lifts of 1.75 inch (total 3.5 inches) thick base course (12.5 mm asphalt mix). The asphalt should be constructed in accordance with LaDOTD Specification Part V – Asphalt Pavements.
  - Base Course – As mentioned earlier, the base course material should be a crushed stone material (LaDOTD Class II Base Course) meeting the stone gradation specified under Section 1003.03 (b) of the LaDOTD specifications. The base course material should be constructed in accordance with LaDOTD specification Section 302.

7.6 Drainage

Adequate drainage should be provided to minimize any increase in the moisture content of the foundation soils. The drainage from the roof systems, pavement areas and/or yard should be directed away from the foundation systems to prevent the ponding of water around the structures.

7.7 Landscaping

All trees should be located at least 30 feet from the building, crypt and columbarium projects. This will reduce the soil moisture loss from beneath these project areas due to plant uptake and thus reduce the potential for shrinkage of the foundation soils. Shrubbery may be planted closer to these structures, however, the issue of soil moisture loss should be considered when choosing the shrub type.

7.8 Potential Construction Problems/Issues

1. Unstable Soil Conditions:

The potential always exists for unstable (i.e. pumping) soil conditions to be encountered during site preparation work. Undrained, saturated soils are typically the cause. Unless otherwise noted in this report, the problem is typically:

- Localized or confined to an area, such as a ditch or low-lying area that is/was poorly drained;
- Affected by the groundwater situation; and/or
- Restricted to an area that has conveyed/held water in the past.

If normal site work activities, such as discing and aeration, cannot dry the soil to a moisture level that will allow proper compaction and stabilization, the area should be inspected by a geotechnical engineer so that a remedial plan can be developed. Such a plan typically involves either:

- Over excavation of the unstable soils and construction of an engineered fill to bridge the affected area; and/or
- Installation of a geogrid material/aggregate mat over the affected area.

2. Groundwater:

If excavation activities are performed to depths of 0 to 8' bgs, groundwater should not be encountered. If water is encountered at such depths, it is probably not associated with either the perched source or the surficial aquifer, but is more likely associated with trapped water from stormwater and/or rainfall events.

If groundwater is encountered, dewatering operations may be required to prepare any excavation or trench work for the proposed construction activities. Anticipated dewatering systems will probably consist of a simple, sump/sump pump system. The discharge from the system should be directed to a drainage ditch or other stormwater collection system.

The Louisiana Department of Environmental Quality (LDEQ) should be contacted to determine if a permit will be needed for the discharge from the dewatering system. Bonnie Wascom with LDEQ will know if the discharge requires a Louisiana discharge permit; her phone number is 225/219-0803.

8.0 REPORT LIMITATIONS

The recommendations provided herein were developed from the information obtained from both the site reconnaissance and the test borings which depict subsurface conditions only at the specific locations and the particular time designated on the logs. Soil conditions at other locations may differ from conditions occurring at the boring locations. The nature and extend of variations between the borings may not become evident until the course of construction. If variations are encountered, it will be necessary to re-evaluate the recommendations of this report after performing on-site observations during the excavation period and noting the characteristics of these variations.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. This company is not responsible for the independent conclusions, opinions and/or recommendations made by others based on the field exploration and laboratory test data presented in this report.

9.0 USER RELIANCE

This report was requested/authorized by CLIENT and was prepared for use by CLIENT based on the CLIENT – approved scope of services, schedule and cost estimate. This report shall not be relied upon by and/or transferred to another party without the written consent of BURLE.

END OF REPORT